

29-01-2001

ART 34 ABNT

PCT/EP99/07633
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Our Ref.: C 1748 PCT

Claims

1. A recombinant DNA molecule comprising:
 - (i) a nucleic acid molecule encoding a subtilisin-like serine protease or encoding a biologically active fragment of such a protein, selected from the group consisting of
 - (a) nucleic acid molecules comprising a nucleotide sequence encoding a protein comprising the amino acid sequence as given in SEQ ID NO: 2, 8, 10 or 12;
 - (b) nucleic acid molecules comprising a nucleotide sequence as given in SEQ ID NO: 1, 7, 9 or 11;
 - (c) nucleic acid molecules encoding a protein comprising at least the D region, H region, substrate binding site and/or S region of the subtilisin-like serine protease encoded by a nucleic acid molecule of (a) or (b); or
 - (d) nucleic acid molecules hybridizing with the complementary strand of a nucleic acid molecule as defined in any one of (a) to (c);
 - (e) nucleic acid molecules encoding a protein the amino acid sequence of which is at least 65% identical to the amino acid sequence encoded by a nucleic acid molecule of any one of (a) to (c);
 - (f) nucleic acid molecules, the nucleotide sequence of which is degenerate as a result of the genetic code to a nucleotide sequence of a nucleic acid molecule as defined in any one of (a) to (e); or
 - (ii) a nucleic acid molecule encoding a mutant non-active or a hyper-active form of or an antibody against the subtilisin-like serine protease encoded by a nucleic acid molecule of (i); or

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(iii) a nucleic acid molecule which specifically hybridizes with a nucleic acid molecule of (i) or the complementary strand thereof.

2. The recombinant DNA molecule of claim 1 wherein the nucleic acid molecule is DNA, cDNA, genomic DNA or synthetically synthesized DNA.
3. The recombinant DNA molecule of claim 1 wherein the nucleic acid molecule is derived from a plant, preferably Arabidopsis or potato.
4. The recombinant DNA molecule of any one of claims 1 to 3 wherein said nucleic acid molecule is operably linked to regulatory elements allowing the expression of the nucleic acid molecule in plants.
5. A vector comprising a recombinant DNA molecule of any one of claims 1 to 4.
6. A host cell containing a vector of claim 5 or a recombinant DNA molecule of any one of claims 1 to 4.
7. A method for the production of transgenic plants with altered stomata characteristics compared to wild type plants comprising the introduction of a recombinant DNA molecule of any one of claims 1 to 4 or the vector of claim 5 into the genome of a plant, plant cell or plant tissue.
8. A transgenic plant cell comprising stably integrated into the genome a recombinant DNA molecule of any one of claims 1 to 4 or a vector of claim 5 or obtainable according to the method of claim 7, wherein the expression of the nucleic acid molecule results in an increased expression or activity of subtilisin-like serine proteases in transgenic plants compared to wild type plants.
9. A transgenic plant or a plant tissue comprising plant cells of claim 8.

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10. The transgenic plant of claim 9 which displays a decreased stomata density, lower conductance of stomata and/or wherein the water consumption is lowered compared to wild type plants.

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11. A transgenic plant cell which contains stably integrated into the genome a recombinant DNA molecule of any one of claims 1 to 4 or part thereof, a vector of claim 5 or obtainable according to the method of claim 7, wherein the presence, transcription and/or expression of the nucleic acid molecule or part thereof leads to reduction of the synthesis or the activity of subtilisin-like serine proteases in transgenic plants compared to wild type plants.

12. The plant cell of claim 11, wherein the reduction is achieved by an antisense, sense, ribozyme, co-suppression and/or dominant mutant effect.

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13. A transgenic plant or plant tissue comprising the plant cells of claim 11 or 12.

14. The transgenic plant of claim 13 which displays increased stomatal density and/or higher conductance of stomata and/or increased content of sugars and/or protein in plant leaves compared to wild type plants.

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15. The transgenic plant of any one of claims 9, 10, 13 or 14, the plant cell of any one of claims 8, 11 or 12, or the plant tissue of claim 9 or 13, wherein said plant, plant cell or plant tissue is derived from a monocotyledonous or dicotyledonous plant.

16. The transgenic plant, plant cell or plant tissue of claim 15, wherein said plant is derived from maize, rice, barley, wheat, rye, oats, tomato, melon, banana, chicoree, salad, cabbage, potato, tobacco, alfalfa, clover, oilseed rape, sunflower, peanut, soybean, cotton, sugar beet, linseed, flax, millet, hemp, sugar cane, bean, pea or tree.

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17. Harvestable parts or propagation material of plants of any one of claims 9, 10, 13 or 14 to 16 comprising plant cells of claim 8, 11, 12, 15 or 16.

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18. A kit comprising a recombinant DNA molecule of any one of claims 1 to 4 or a vector of claim 5.
19. A method for the production of a transgenic plant comprising an increased yield and/or increased stomatal density compared to wild type plants, wherein
- (a) a plant cell is genetically modified by the introduction of a foreign nucleic acid molecule the presence of which or the expression of which results in a decreased activity of a subtilase;
 - (b) a plant is regenerated from the cell prepared according to step (a); and
 - (c) further plants, if any, are generated from the plant prepared according to step (b).
20. A method for the production of a transgenic plant having a decreased water consumption and/or decreased stomatal density compared to wild type plants wherein
- (a) a plant cell is genetically modified by the introduction of a foreign nucleic acid molecule the presence of which or the expression of which results in an increased activity of a subtilase;
 - (b) a plant is regenerated from the cell prepared according to step (a); and
 - (c) further plants, if any, are generated from the plant prepared according to step (b).
21. Use of a nucleic acid molecule encoding or regulating the expression of a subtilisin-like serine protease or a nucleic acid molecule hybridizing with such a nucleic acid molecule, a nucleic acid molecule as defined in any one of claims 1 to 4, a recombinant DNA molecule of any one of claims 1 to 4, or a vector of claim 5 for the production of plants with improved fresh and dry weight, for enhancing the content of sugars and/or protein in plant leaves for the production of plants with reduced leaf temperatures or with reduced water loss and lower water consumption, for the modulation (enhancement) of CO₂ uptake into and H₂O release from leaves, for sustained photosynthesis under high intensity conditions or for the improvement of disease resistance of plants.